# 100V N-Channel Enhancement Mode MOSFET

## 1.Product Information

### 1.1 Features

- ◇ Ultra FET 1 Power-MOSFET
- ◇ Low Gate Charge
- ◇ Low On-Resistance
- ◇ RoHS and Halogen-Free Compliant
- ◇ 100% ΔVDS & UIS & Rg Tested

### 1.2 Applications

- ◇ DC-DC Converter
- ◇ Drones
- ◇ Motor drivers
- ◇ Light electric vehicles

### 1.3 Quick reference

- ◇ BV ≧ 100 V
- ◇ $P_{tot}$ ≦ 441 W
- ◇ $I_D$ ≦ 429 A
- ◇ $R_{DS(ON)}$ ≦ 1.6 mΩ @ $V_{GS}$ = 10 V
- ◇ $R_{DS(ON)}$ ≦ 2.8 mΩ @ $V_{GS}$ = 4.5 V

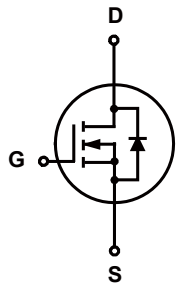
Green Product

RoHS

Ultra FET

## 2.Pin Description

Symbol




Simplified Outline

Top View

TOLL

## 3.Limiting Values

| Symbol | Parameter | Conditions | Min | Max | Unit | Note |
|---|---|---|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | $T_C$ = 25 ℃ | - | 100 | V | - |
| $V_{GS}$ | Gate-Source Voltage | $T_C$ = 25 ℃ | - | ±20 | V | - |
| $I_D$* | Drain Current ( DC ) | $T_C$ = 25 ℃, $V_{GS}$ = 10 V | - | 429 | A | Fig.2 |
| | | $T_C$ = 100 ℃, $V_{GS}$ = 10 V | - | 303 | A | |
| $I_{DM}$**,*** | Drain Current ( Pulsed ) | $T_C$ = 25 ℃, $V_{GS}$ = 10 V | - | 696 | A | - |
| $P_{tot}$ | Drain power dissipation | $T_C$ = 25 ℃ | - | 441 | W | Fig.1 |
| | | $T_C$ = 100 ℃ | - | 220 | W | |
| $T_{stg}$ | Storage Temperature | | -55 | 175 | ℃ | - |
| $T_J$ | Junction Temperature | | - | 175 | ℃ | - |
| $I_S$ | Continuous-Source Current | $T_C$ = 25 ℃ | - | 429 | A | - |
| $E_{AS}$* | Single Pulsed Avalanche Energy | $V_{DD}$= 100 V,L= 0.1 mH | - | 1151 | mJ | Fig.19 |

## 4.Thermal Characteristics

| | | | | | |
|---|---|---|---|---|---|
| $R_{\theta JA}$* | Thermal Resistance- Junction to Ambient | - | 14 | ℃/W | Fig.16 |
| $R_{\theta JC}$* | Thermal Resistance- Junction to Case | - | 0.34 | | |

Notes：

* Surface Mounted on 1 in² pad area, t ≤ 10 sec

** Pulse width ≤ 300 μs, duty cycle ≤ 2 %

*** limited by bonding wire

## 5.Marking Information

| Product Name | Package | Reel size | Tape width | Quantity | Note |
|---|---|---|---|---|---|
| LNU013N100T | TOLL | 330mm | 24mm | 2000 | |

Note: COMTECH defines “ Green ” as lead-free ( RoHS compliant ) and halogen free ( Br or Cl does not exceed900 ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500 ppm by weight;Follow IEC 61249-2-21 and IPC / JEDEC J-STD-020C )

## 6. Electrical Characteristics ( $T_A$=25 ° Unless Otherwise Noted )

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | Note |
|---|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_{DS}$ = 250 μA | 100 | - | - | V | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_{DS}$ = 250 μA | 1 | - | 3 | V | |
| $I_{DSS}$ | Drain Leakage Current | $V_{DS}$ = 100 V, $V_{GS}$ = 0 V | - | - | 1 | μA | |
| $I_{GSS}$ | Gate Leakage Current | $V_{GS}$ = ± 20 V, $V_{DS}$ = 0 V | - | - | ±100 | nA | |
| $R_{DS(ON)}$[a] | On-State Resistance | $V_{GS}$ = 10 V, $I_{DS}$ = 50 A | - | 1.5 | 1.6 | mΩ | Fig.8 |
| | | $V_{GS}$ = 4.5 V, $I_{DS}$ = 30 A | - | 2.6 | 2.8 | | |
| **Diode Characteristics** | | | | | | | |
| $V_{SD}$[a] | Diode Forward Voltage | $I_{SD}$ = 50 A, $V_{GS}$ = 0 V | - | - | 1.3 | V | Fig.7 |
| $t_{rr}$ | Reverse Recovery Time | $I_{DS}$ = 50 A, $V_{GS}$ = 0 V | - | 63 | - | nS | Fig.20 |
| $Q_{rr}$ | Reverse Recovery Charge | $dI_{SD/dt}$ = 100 A/μs | - | 546 | - | nC | |
| **Dynamic Characteristics**[b] | | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$ = 0 V, $V_{DS}$ = 50 V Frequency = 1 MHz | - | 4367 | - | pF | Fig.10 |
| $C_{oss}$ | Output Capacitance | | - | 2455 | - | | |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 11 | - | | |
| $R_G$ | Gate Resistance | F= 1 MHz | - | 4.5 | - | Ω | |
| $t_d$(on) | Turn-on Delay Time | $V_{DS}$ = 50 V, $V_{GS}$= 10 V, $R_G$=2.7 Ω, $R_L$ = 4 uH, $I_{DS}$ = 50 A | - | 19 | - | nS | Fig.18 |
| $t_r$ | Turn-on Rise Time | | - | 82 | - | | |
| $t_d$(off) | Turn-off Delay Time | | - | 121 | - | | |
| $t_f$ | Turn-off Fall Time | | - | 92 | - | | |
| dv/dt | Peak Diode Recovery | | - | 0.486 | - | KV/us | |
| di/dt | Peak Diode Recovery | | - | 779 | - | A/us | |
| **Gate Charge Characteristics**[b] | | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{DS}$ = 50 V, $V_{GS}$ = 10 V, $I_{DS}$ = 50 A | - | 66 | - | nC | Fig.9 |
| $Q_{gs}$ | Gate-Source Charge | | - | 88 | - | | |
| Qgd | Gate-Drain Charge | | - | 9 | - | | |
| Vplateau | Gate plateau voltage | | - | 3.1 | - | V | |

Notes :
a : Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2%
b : Guaranteed by design, not subject to production testing

## 7. Typical Characteristics

Fig.1 Power Capability

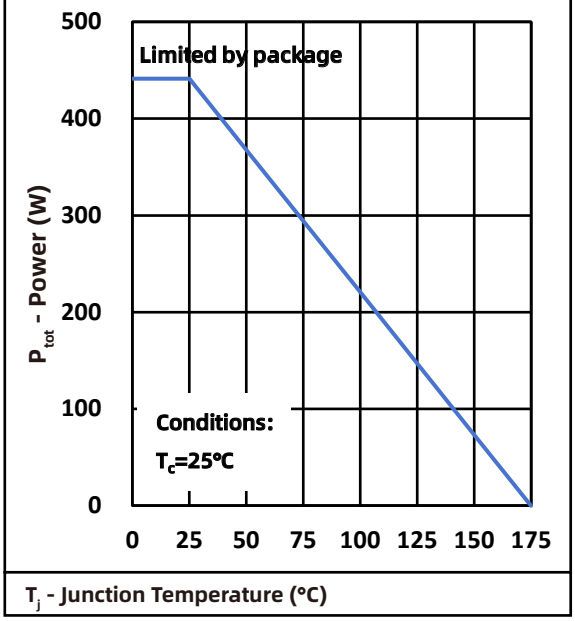



Fig.2 Current Capability

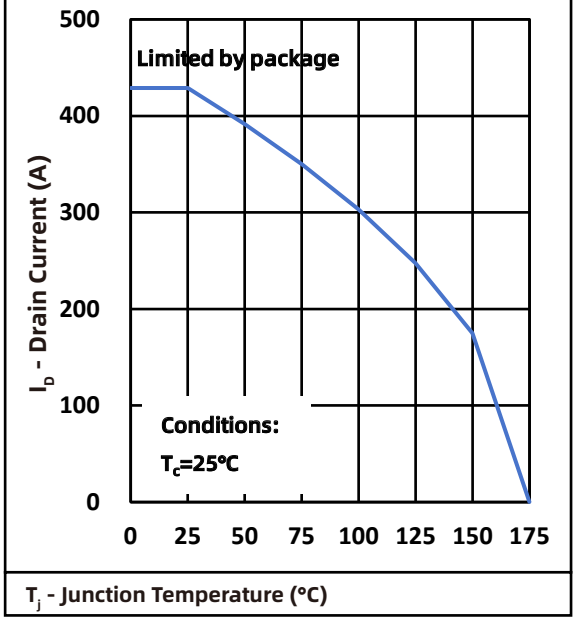



Fig.3 Output Characteristics@Tj -55℃

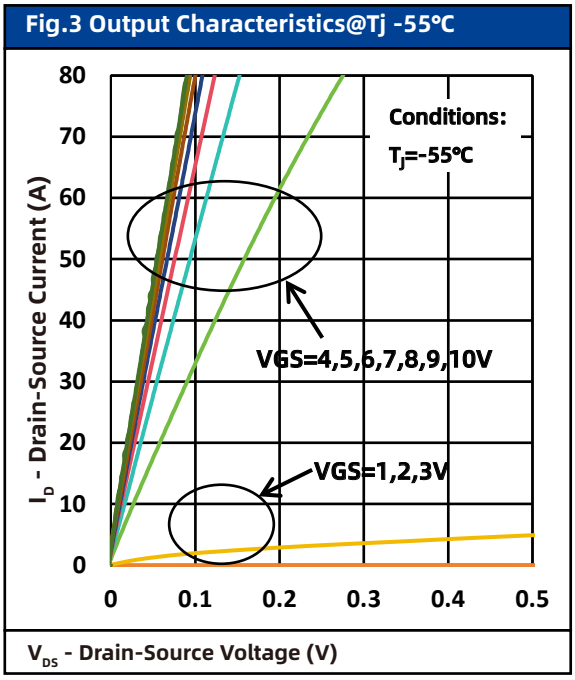
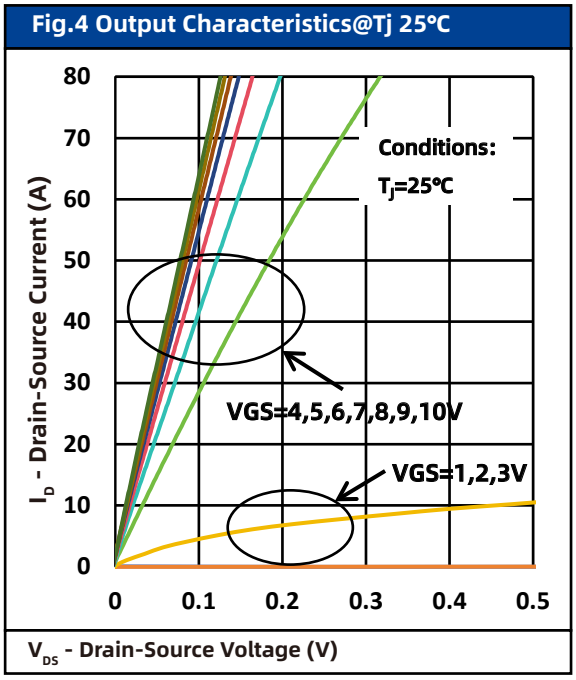



Fig.4 Output Characteristics@Tj 25℃



## 7. Typical Characteristics

Fig.5 Output Characteristics@Tj 175℃

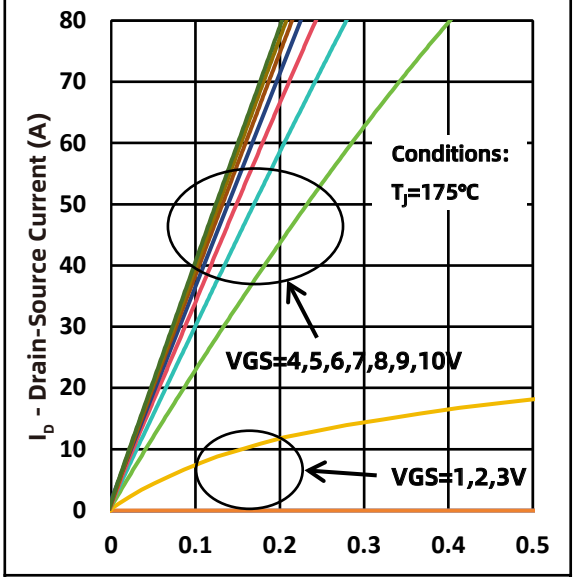



Fig.6 Transfer Characteristics vs Temp

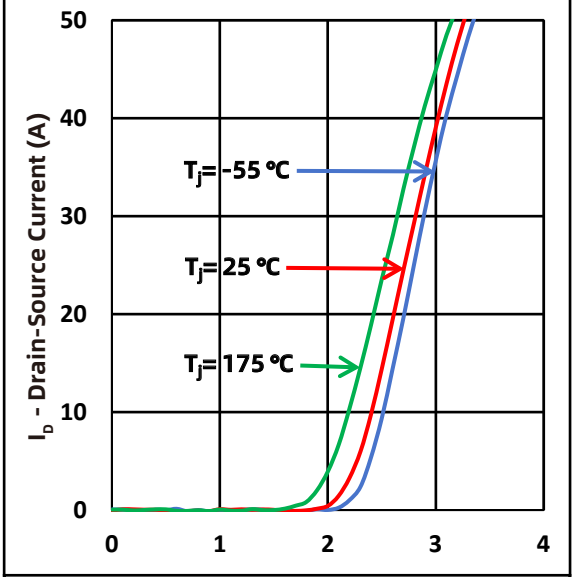



Fig.7 Body Diode Characteristics

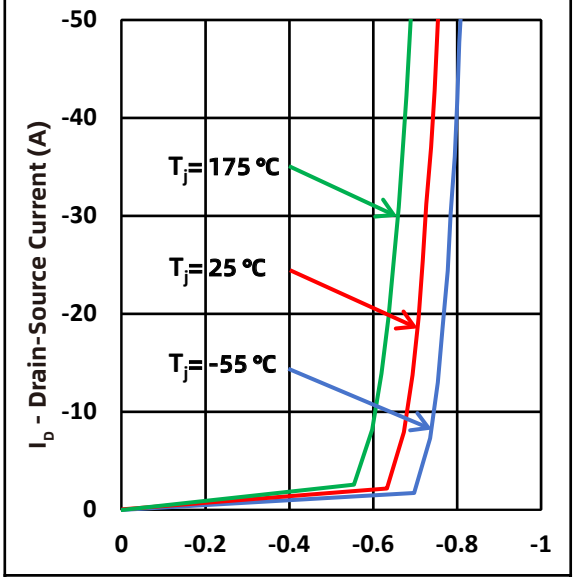
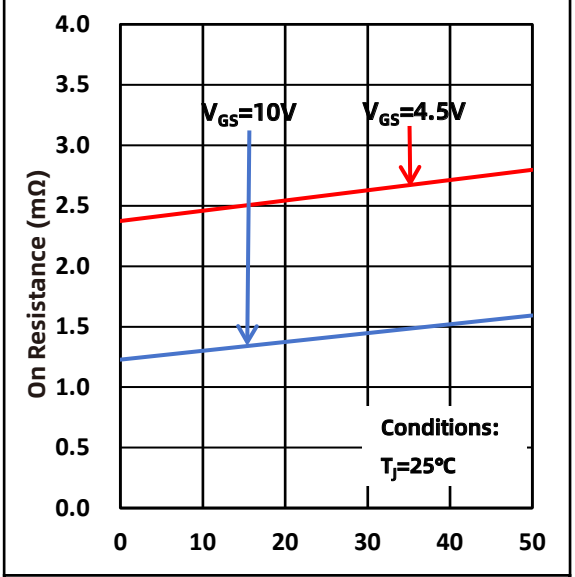



Fig.8 Drain-Source On Resistance



## 7. Typical Characteristics

**Fig.9 Gate Charge**

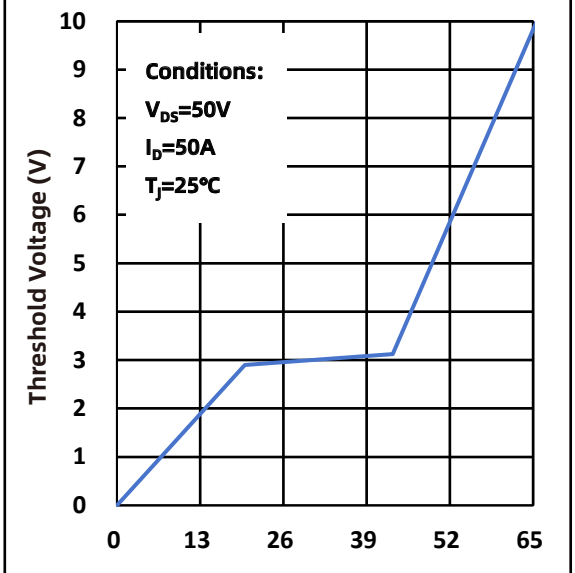



**Fig.10 Capacitance**

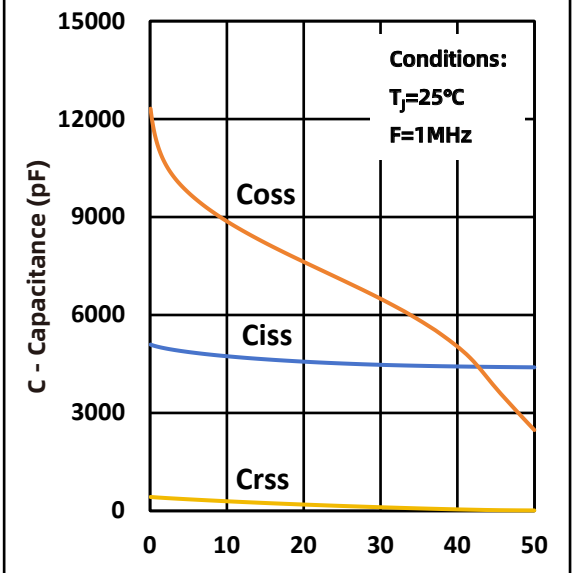



**Fig.11 Normalized Threshold Voltage**

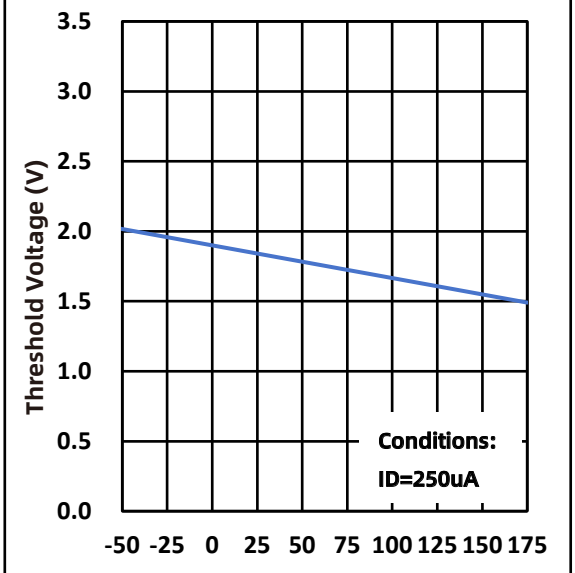
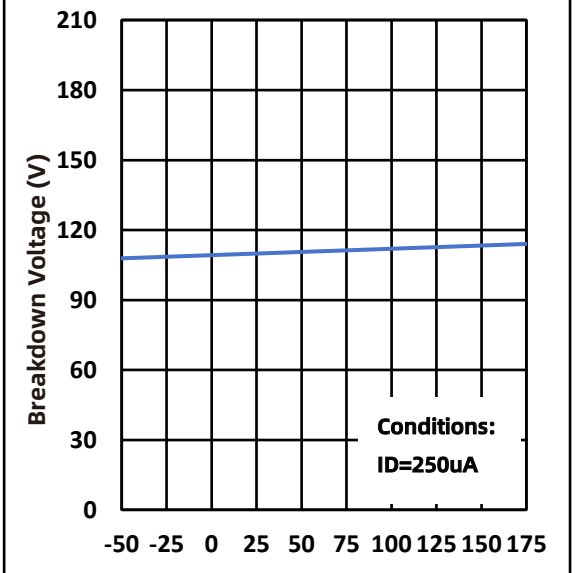
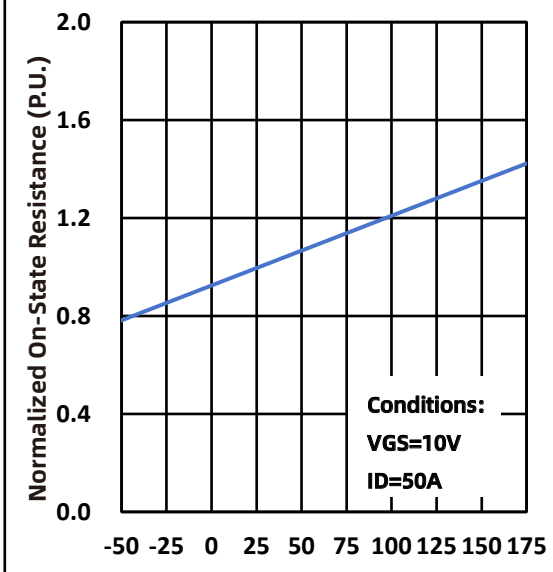



**Fig.12 Normalized Breakdown Voltage**



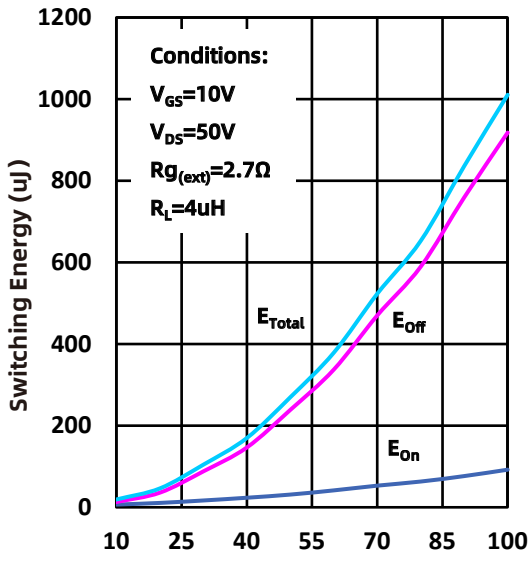
## 7. Typical Characteristics

**Fig.13 Normalized On Resistance**



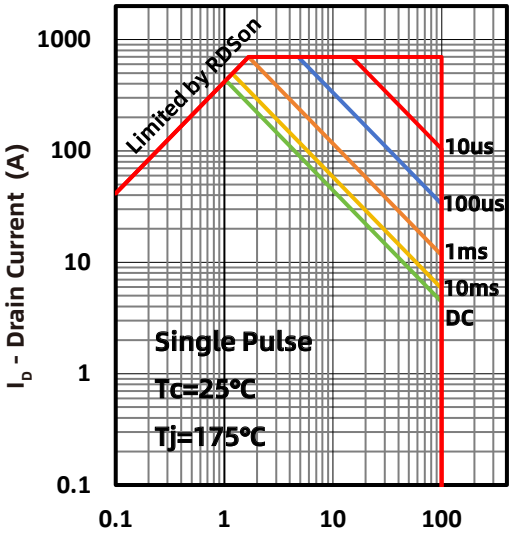

$T_j$ - Junction Temperature (°C)

**Fig.14 Switching Energy vs ID**



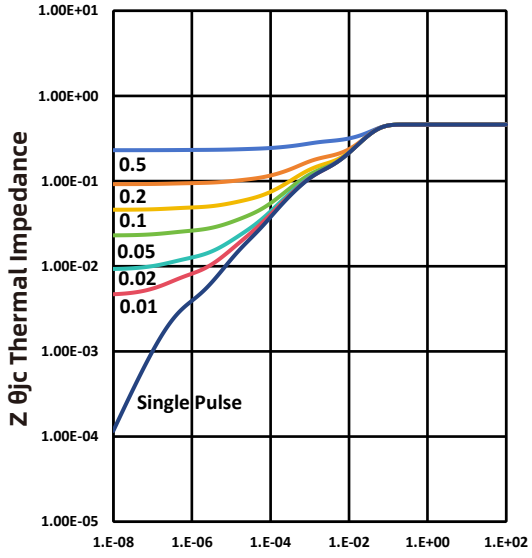

$I_{DS}$- Drain-Source Current. (A)

**Fig.15 Safe Operating Area**




$V_{DS}$ - Drain-Source Voltage (V)

**Fig.16 Transient Thermal Impedance**




Square Wave Pulse Duration (sec)

## 7. Typical Characteristics

**Fig.17 Gate Charge Test Circuit & Waveform**

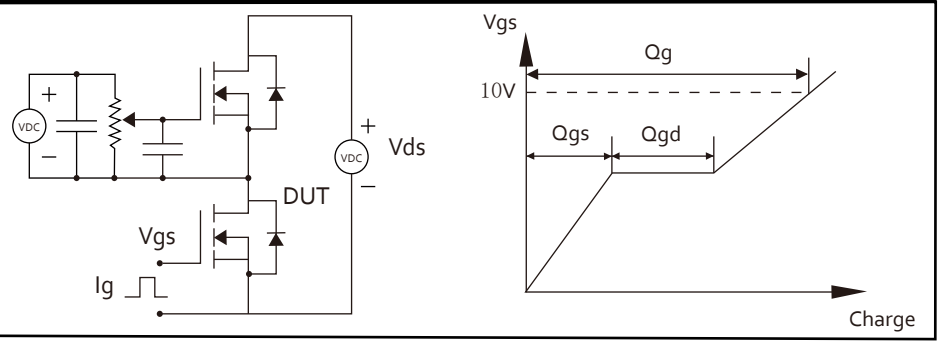



**Fig.18 Resistive Switching Test Circuit & Waveforms**

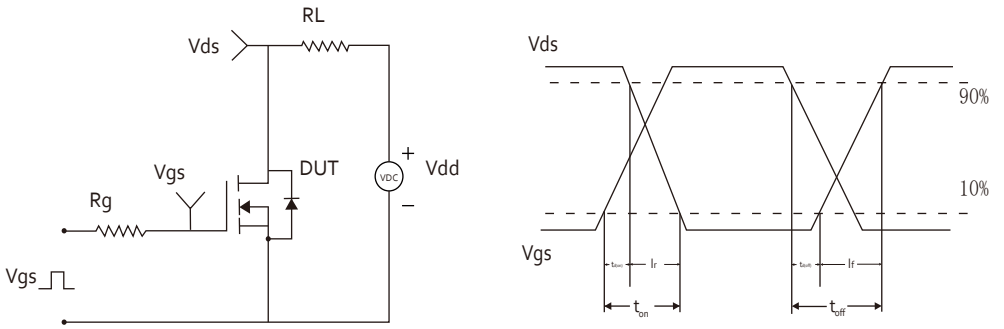



**Fig.19 Unclamped Inductive Switching (UIS) Test Circuit & Waveforms**

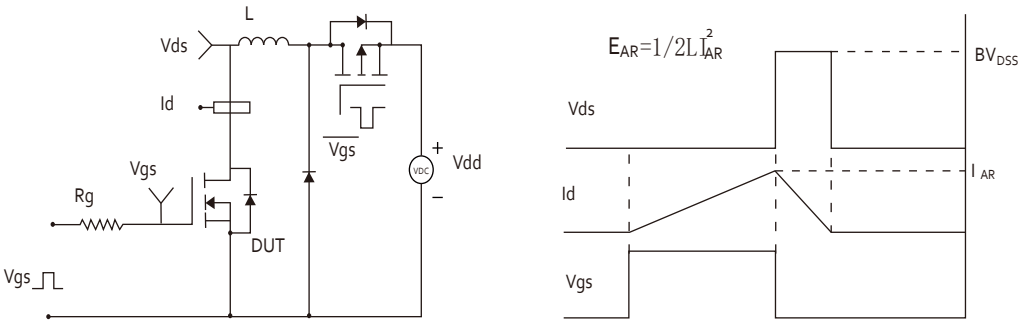
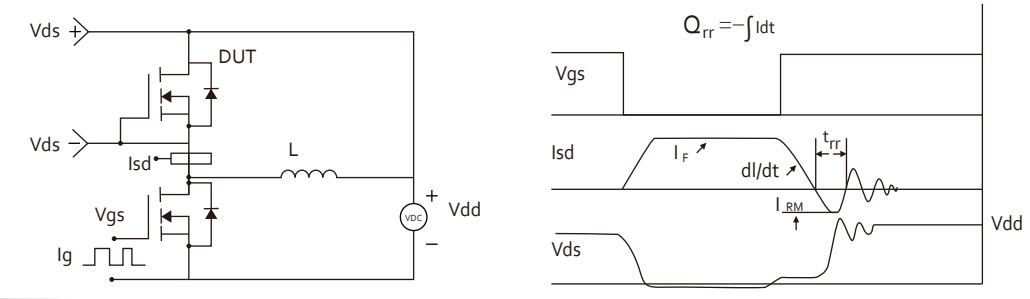
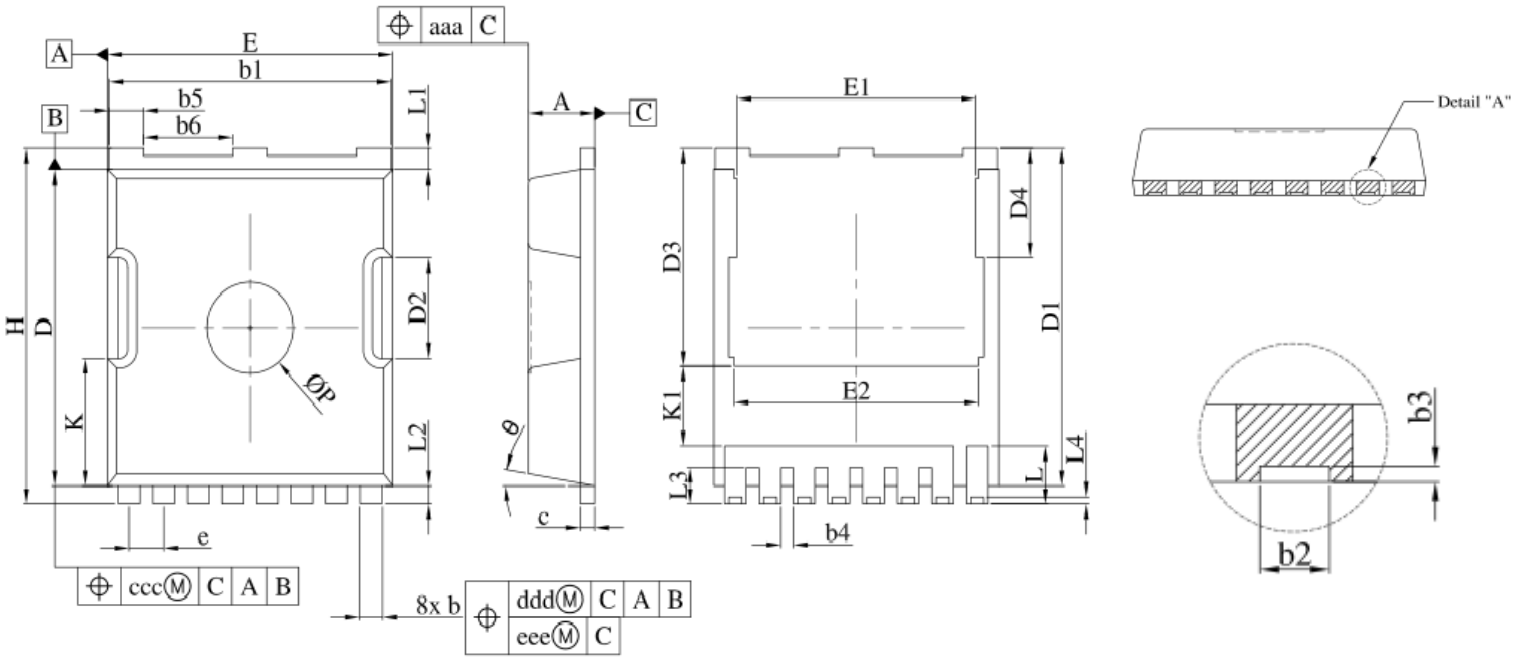



**Fig.20 Diode Recovery Test Circuit & Waveforms**



## 8. Package Dimensions

**TOLL Package**




| Symbol | Dimensions In Millimeters | | |
|---|---|---|---|
| | Min. | NOMINAL | Max. |
| A | 2.20 | 2.30 | 2.40 |
| b | 0.70 | 0.80 | 0.90 |
| b1 | 9.70 | 9.80 | 9.90 |
| b2 | 0.36 | 0.45 | 0.55 |
| b3 | 0.05 | 0.10 | 0.35 |
| b4 | 0.30 | 0.40 | 0.50 |
| b5 | 1.10 | 1.20 | 1.30 |
| b6 | 3.00 | 3.10 | 3.20 |
| c | 0.40 | 0.50 | 0.60 |
| D | 10.28 | 10.38 | 10.55 |
| D1 | 10.98 | 11.08 | 11.18 |
| D2 | 3.20 | 3.30 | 3.40 |
| D3 | 7.00 | 7.15 | 7.30 |
| D4 | 3.44 | 3.59 | 3.74 |
| e | 1.10 | 1.20 | 1.30 |
| E | 9.80 | 9.90 | 10.00 |
| E1 | 8.20 | 8.30 | 8.40 |
| E2 | 8.35 | 8.50 | 8.65 |
| H | 11.50 | 11.68 | 11.85 |
| K | 4.08 | 4.18 | 4.28 |
| K1 | 2.45 | - | - |
| L | 1.60 | 1.90 | 2.10 |
| L1 | 0.50 | 0.70 | 0.90 |
| L2 | 0.50 | 0.60 | 0.70 |
| L3 | 1.00 | 1.20 | 1.30 |
| L4 | 0.13 | 0.23 | 0.33 |
| P | 2.85 | 3.00 | 3.15 |
| θ | 10°REF | | |
| aaa | 0.20 | | |
| ccc | 0.20 | | |
| ddd | 0.25 | | |
| eee | 0.20 | | |

## 9. Record of Document amendment

产品名称：LNU013N100T
文档类型：产品手册
版权说明：镭诺电子（宁波）有限公司
联系电话：4008887385
公司主页：www.leinuosemi.com

版本：02
修改记录：
1.初版发行
2.修改Fig.13不同温度下内阻值的相对变化量，采用归一化物理量变化单位值（P.U.）